THE POLYZOA OF SOME BRITISH JURASSIC CLAYS

BRITISH MUSEUM
14 AUG 1969
NATURAL HISTORY

BY
LESLIE JOHN PITT
&
the late HENRY DIGHTON THOMAS

Pp. 29–38; 4 *Plates*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
GEOLOGY Vol. 18 No. 2
LONDON: 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

In 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

This paper is Vol. 18, *No.* 2 *of the Geolological (Palaeontological) series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

World List abbreviation:
Bull. Br. Mus. nat. Hist. (Geol.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 12 *August*, 1969 *Price Eleven Shillings*

THE POLYZOA OF SOME BRITISH JURASSIC CLAYS

By L. J. PITT & the late H. D. THOMAS

ABSTRACT

Two new species of Polyzoa from Hampen Marly Beds (Bathonian) are described and figured, and Gregory's figured types of *Berenicea parvitubulata* are re-described. *Berenicea spatiosa* Gregory *non* Walford is discussed.

INTRODUCTION

Compared with the faunas of the Lias and the Bradford Clay the number of species of Polyzoa recorded from other Jurassic clays is small.

Three species of Polyzoa, *Stomatopora dichotoma*, *Berenicea diluviana* and *B. archiaci*, were found at Woodham's Brick Pit about six miles west of Aylesbury (National Grid Reference 42/707186). This pit is in the *mariae* zone of the Lower Oxfordian and the *athleta* and *lamberti* zones of the *Callovian* somewhat above the more carbonaceous shales sought by the Fletton brickmakers. We were unable to find Polyzoa in the more carbonaceous shales of the *coronatum* zone in the London Brick Co.'s Pit at Calvert, a few miles to the West. There appeared to be a possible connection between the presence of much carbon and the absence of Polyzoa. With the aid of a grant from the Godman Exploration Fund many pits were visited from the Dorset Coast to Warboys in Huntingdonshire. Unfortunately we found few exposures in the higher zones but at Warboys the pit is worked in both the highly carbonaceous shales and the less carbonaceous Upper Oxford Clay. (This pit belongs to the London Brick Co. and the National Grid Reference is 52/309818). None of the highly carbonaceous shales yielded Polyzoa but in the upper part of the Warboys Pit we found the same two species of *Berenicea* as we had recorded from Woodham. They were encrusting *Gryphaea*, which was abundant in both the upper and the lower parts of the exposure. No Polyzoa were found on the *Gryphaea* from the lower part. The absence of Polyzoa could not therefore be accounted for by the lack of suitable hosts but could be attributed to the depositional conditions which caused the high carbon content.

We had found poorly preserved *Berenicea parvitubulata* encrusting *Ostrea hebridica* at Temple Mill Quarry, Sibford Ferris, Oxfordshire (National Grid Reference SP 347362), in a thin seam of clay above the Great Oolite White Limestone. Dr. W. S. McKerrow suggested we should look at a temporary exposure in the Hampen Marly Beds at Enstone, where abundant *Ostrea hebridica* had been found in a silage pit in a field opposite the reservoir (National Grid Reference SP 377237). This is lower in the succession and slightly older than the Great Oolite White Limestone. These proved extremely interesting as they were encrusted with Polyzoa in a much better state of preservation than is usual in the Jurassic. Only four species were found, including two new species described here for the first time, but the number of specimens was large and included all states of development.

ACKNOWLEDGMENTS

Our thanks are due to the Trustees of the Godman Exploration Fund for a grant to facilitate the collection of further material, to Dr. W. S. McKerrow for information regarding the Enstone exposure, to the Sedgwick Museum, Cambridge, for the loan of the specimen of *Stomatopora dichotoma* described by Haime and his type of *S. waltoni*, and the owners and managers of the many quarries visited. Especially we would thank Dr. A. B. Hastings for her help and advice, particularly in connection with the brood-chambers in *Stomatopora*, for reading the manuscript and making useful criticisms.

Order STENOLAEMATA Borg 1926

Sub-order CYCLOSTOMATA Busk

Family **TUBULIPORIDAE** Johnston

STOMATOPORA Bronn 1825

Stomatopora dichotoma (Lamouroux) 1821

(Pl. 4, fig. 1)

1821 *Alecto dichotoma* Lamouroux : 86, pl. 81, figs. 12–14.
1896 *Stomatopora dichotoma* Gregory : 43, pl. 1, figs. 1, 2 *Cum. syn.*
1940 *Stomatopora dichotoma* Orieux : 3–13, pls. 1–4.
1963 *Stomatopora dichotoma* Illies : 75, pl. 3, figs. 1–4, pl. 4, figs. 1–5, pl. 5, figs. 1–3, pl. 6, figs. 1–3.

Diagnosis. *Stomatopora* typically forming a loose irregular radiating, many branched zoarium. Zooecia cylindrical, peristomes well raised, surface punctate and transversely wrinkled. The zooecia increase in diameter after the second or third dichotomy.

Material. D 41608, D 41609 and D 41610 from the Oxford Clay, Woodham's Pit, near Aylesbury. D 51465 and D 51466 from the Hampen Marly Beds, Enstone, Oxfordshire.

Remarks. All the mature specimens of *Stomatopora* collected from the above localities come within the definition of *S. dichotoma* (Lamouroux) given by Gregory (1896) and the measurements given by Illies (1963). Lang (1904) commented that species of *Stomatopora* could not be differentiated unless whole zoaria were compared. Some specimens we collected were in an early stage of development and quite indistinguishable from the type of *S. waltoni* Haime (1854) specimen J. 5828 in the Sedgwick Museum, Cambridge. Zoaria which attain maturity are quite distinct. After the second or third dichotomy the zooecia are larger and less regular than those of *S. waltoni*. As all the mature zoaria collected are *S. dichotoma* we conclude that the immature colonies belong to this species also.

Canu & Bassler (1920 : 652), placed the genus *Stomatopora* in the Inovicellata when only Gregory's somewhat dubious brood-chambers had been described and figured. Since then brood-chambers in recent *Stomatopora* have been described and figured by Borg (1926 : 358, text-fig. 66, *S. eburnea*; text-figs. 67 and 68, *S. granulata*, and

1944 : 24, pl. 1, fig. 2, *S. eburnea*), and by Osburn (1953 : 45, pl. 65, fig. 2, *S. granulata*). They are typical Cyclostome brood-chambers of the simplest kind, consisting of a single zooid, inflated distally to form a chamber which may be slightly lobed and has finely punctate walls.

After cleaning by modern methods the " hemispherical tubercle " of Gregory's figured specimen proved to be the peristome of a lateral branch from an adjacent series of zooecia that had been overgrown by its neighbour. The apparent lateral branch on the right of the figure is in fact this underlying branch. We made a careful scrutiny of all our material for possible brood-chambers and the few structures picked out for closer examination all proved to have been produced in ways comparable to Gregory's specimen. So far no fossil brood-chambers have been found in this genus.

Stratigraphy. This is a long ranging species recorded in Great Britain from the Lower Lias to the Cornbrash. The Woodham's Pit specimens are interesting as they extend this range up into the Oxford Clay.

BERENICEA Lamouroux 1821

Berenicea enstonensis sp.nov.

(Pl. 1, fig 1; Pl. 4, figs 2–3.)

Diagnosis. *Berenicea* with transversely ribbed zooecia, the transverse ribs forming prominent concentric ridges on the zoarium, apertures longitudinally elongate, with slightly raised, well defined, peristomes; brood-chambers transversely triangular.

Holotype. D 51452 and paratype D 51453, encrusting valves of *Ostrea hebridica* from the Hampen Marly Beds, Enstone, Oxfordshire.

Other material examined D 51449, 51450 and 51451 from the same locality.

Description. Zoarium thin, encrusting, flabelliform in the young stages, becoming irregularly discoidal in adult stages. Zooecia slender, visible practically throughout their length, not very inflated, cylindrical, front wall with narrow, transverse ribs which are continuous across adjacent zooecia (except where interrupted by brood-chambers) forming concentric ridges on the zoarium. The zooecial apertures are oval, elongated in the proximal-distal direction, peristomes slightly raised, arranged mainly in quincunx.

The brood-chambers are transversely triangular, widest at the distal edge, with rounded corners, slightly inflated, smooth, enveloping several zooecial tubes, the openings of which are arranged almost symmetrically, ooeciostome median, placed nearly on the distal margin of the brood-chamber, slightly smaller than the normal zooecial apertures.

Measurements.

Width of zooecia	0·13 mm.
Width of aperture	0·07 mm.
Width of brood-chamber . . .	0·8 mm.
Separation of transverse ribs . .	0·045 mm.

Remarks. In all the Enstone specimens the measurements are remarkably constant. It was not possible to make measurements of the zooecial length as the ribbing masks the initiation of the zooecia. The largest zoarium examined, D 51450 is 6 mm. in diameter.

This species is well characterized by its strong transverse ribs. Similar ribbing is found in *Berenicea portlandica* Gregory (1896 : 83, pl. 3, fig. 5) but its zooecia are larger. Gregory compared that species with *B. striata* Haime (1854 : 179, pl. 7, figs. 8a, b,) to which he also doubtfully referred two British specimens (1896; pp. 84–85). Haime described his species as having fine and numerous ribs, and his figure indicates that these were much finer than those of *B. enstonensis*. Of the two specimens referred to by Gregory, one, D 1785 is very much worn and is specifically indeterminate. The other specimen, D 2215, lacks strong ribs and is neither *B. striata* nor *B. enstonensis*. *Proboscina rigauxi* (Sauvage, 1889 : 42, pl. 3, figs. 6–8), from the Bathonian of Hydrequent, Boulonnais, also has transverse ribs but the Cornbrash specimen figured by Gregory (1896 : 69, pl. 2, fig. 6) not only has the Proboscinoid habit but also has larger zooecia. The material referred to *B. microstoma* (Michelin) by Reuss (1867 : 8, pl. 1, figs. 6a, b,) appears to have similar ribbing but its zooecia are bottle shaped. Similar ribbing occurs in some species of *Reptomultisparsa* d'Orbigny but that genus is distinguished at once from *Berenicea* by its multilamellar zoarium. *Reptomultisparsa undulata* Michelin sp. (1846 : 242, pl. 56, figs. 15a, b) demonstrates these features, see also Gregory, 1896 : 115, pl. 6, figs. 2, 3, and Canu, 1913 : 270).

The transversely triangular brood-chamber is a diagnostic character of those species of *Berenicea* for which Canu introduced the genus *Plagioecia* (1918 : 327). Although the nature of the brood-chamber in the Cyclostomata is of value, its importance as a generic criterion is by no means certain, and hence we prefer to use the term *Berenicea* (cf. Borg, 1926 : 468–470).

Berenicea cobra sp.nov.

(Pl. 3, figs. 1, 3.)

Diagnosis. *Berenicea* with a large irregular zoarium, zooecia variable in length, peristomes circular, prominent, with circular aperture, brood-chambers long, resembling a cobra head in shape, widest at the distal third, gently convex, the oeciostome terminal or nearly so, prominent, transversely elliptical.

Holotype. D 51459 from the Hampen Marly Beds, Enstone, Oxfordshire, encrusting *Ostrea hebridica*.

Description. The holotype is a broken specimen, now semicircular, with a diameter of 14 mm. and encrusts an *Ostrea hebridica*. It abuts against a smaller, nearly circular colony of the same species. The holotype includes two complete and at least two incomplete brood-chambers. On the same shell there are also remains of a younger, flabelliform zoarium, the ancestrular disk is lost and is represented only by a circular scar.

MEASUREMENTS.

	All material examined (mm.)	D 51459 (mm.)
Length of zooecia	0·4 –0·9	0·6–0·9
Width of zooecia	0·125–0·15	0·15
Diameter of aperture	0·085–0·09	0·09
Brood-chamber:		
Length	1·4 –2·35	2·35*
Max. width	0·30 –0·45	0·45*
Ooeciostome:		
Width of aperture	0·11 –0·13	0·13
Height of aperture	0·08 –0·11	0·10

* The best developed brood-chamber.

REMARKS. This species is well characterized by its long brood-chambers, which distinguish it from all other known *Berenicea*. The non-fertile zooecia are similar in size to those of *B. diluviana* Lamouroux (1821 : 81, pl. 80, figs. 3, 4), but the brood-chamber of that species, as figured by Canu (1898 : 267, figs. 1–4), is short but wide. Gregory, however, refers certain English specimens to Lamouroux's species and states that the brood-chamber (= gonocyst) is " pyriform; rather narrow; usually but slightly broader than the zooecia ". Gregory's material is therefore probably not conspecific with *B. diluviana* as interpreted by Canu. Canu refers *B. diluviana* to *Plagioecia* (1918 : p. 327), because of the shape of the brood-chambers. *B. cobra* would fall into *Oncousoecia* if the nature of the brood-chamber is a diagnostic generic character.

Most of the specimens of *B. cobra* are mauve in colour in contrast to the other species found at Enstone.

Berenicea parvitubulata Gregory 1896

(Pl. 1, fig. 2; Pl. 2, figs. 1–3; Pl. 3, fig. 2)

1896 *Berenicea parvitubulata* Gregory : 45.
1896a *Berenicea parvitubulata* Gregory: Gregory : 95, pl. 4, figs. 5, 6.

DIAGNOSIS. Zoarium encrusting, flabelliform or irregularly discoidal. Zooecia narrow, cylindrical, distinct, the central zooecia visible throughout their entire, length, surface plain, peristomes small, slightly raised. Brood-chambers elongated, the width of several zooecia, inflated, ooeciostome median, at or close to the distal border, circular, slightly raised and smaller than the zooecial apertures.

LECTOTYPE. (Here chosen): B.M.(N.H.) No. 60535, Cornbrash, Rushden, Northamptonshire.

We regard the syntype as specifically distinct.

DESCRIPTION OF LECTOTYPE. Zoarium nearly circular, embracing the ancestrula, with two young zoaria budded from it. Zooecial tubes slender, cylindrical, visible

throughout their length, surface plain, peristomes somewhat raised, apertures circular. The measurements of the earlier zooecia are smaller than those of later zooecia. Brood-chambers numerous, elongate triangular, relatively broad, rather inflated, widest at the distal end, ooeciostome median, at or close to the distal border, about half the width of the zooecial tubes; the ends of two or more zooecia covered by the brood-chamber project symmetrically on either side of the ooeciostome; one or two zooecia, symmetrically placed about the mid-line, recline on the proximal ends of the brood-chambers. A few transverse ridges cross the brood-chambers.

Measurements.

	Lectotype (mm.)	Enstone material (mm.)
Width of zooecia in small zoaria or early stages of large zoaria	0·080	0·075
Width of zooecia in later stages of large zoaria	0·135	0·125
Diameter of aperture in small zoaria or early stages of large zoaria	0·038	0·038
Diameter of aperture in later stages of large zoaria	0·060	0·057
Width of brood-chamber at distal end	0·4–0·8	0·22–0·66

Remarks. Most of the Enstone material had smaller zoaria than the lectotype and the measurements were slightly smaller. The ancestrula is well preserved in several specimens as a circular disk from which the protozooecium is budded, giving rise in turn to two or possibly three other zooecia. Distal to these the zoarium takes up its normal shape (see Pl. 2, figs. 2, 3). The preservation is exceptionally good and in a few specimens the growing edge is preserved (see Pl. 2, fig. 1). Brood-chambers were very numerous in the Enstone material, up to six in a zoarium. They vary markedly in shape. All are inflated and all expand in width distally, the majority to a broadly triangular shape but some, after the initial expansion become more or less semi-cylindrical, even in the same zoarium.

The Enstone specimens illustrate very well the gradual increase in size of the zooecia with the growth of the zoarium.

The material obtained from Temple Mill Quarry, Sibford Ferris was worn and crushed and included many immature zoaria. The zooecia were filled with iron pyrites which emphasizes the porous nature of the frontal walls, a feature not seen in the Enstone specimens, presumably because of the calcification.

Although specimen no. 60535 is somewhat worn we designate it as lectotype since D 1912, the other figured syntype of *B. parvitubulata* is, we consider, a different species, possibly *B. spatiosa* (Walford). Fortunately there are a number of zooecia in 60535 which are practically unworn and which show the specific characters. A feature not sufficiently stressed by Gregory is the clear demarcation of the zooecia from one another and their slight elevation distally.

Note on *Berenicea spatiosa* Gregory non Walford

Tubulipora spatiosa Walford (1889 : 567, Pl. 8, figs. 10–12) was referred to *Berenicea* by Gregory (1896 : 86), who included several specimens in the species. As described by Walford, the species is not a *Berenicea* but appears to be a *Tubulipora*. We have examined a number of Gregory's specimens, which are certainly *Berenicea*. Further, they are not all conspecific, e.g. D 30 and D 2174 are markedly different from one another in their characters, and, moreover, D 30, figured by Gregory (1896 : 86, pl. 3, fig. 1) does not agree with his diagnosis.

In specimen D 30, the zoarium encrusts the cylindrical branches of another Polyzoan. The frontal walls of the zooecia are flat and flush with one another. The lines of contact between the zooecia are obscure, but in water are seen to be straight. The peristomes are all well raised and circular and average 0·04 mm. in diameter, the apertures are circular and average 0·025 mm. in diameter.

Specimen D 1912, a figured syntype of *B. parvitubulata* (see note under that species), closely resembles D 30. The measurements of the peristomes and apertures (0·084 mm. and 0·50 mm. respectively) are however about twice those of D 30.

REFERENCES

Borg, F. 1926. Studies on Recent Cyclostomatous Bryozoa. *Zool. Bidnag.* Uppsala **10** : 179–507.

—— 1944. The Stenolaematous Bryozoa. *Swedish Antarctic Exped.* Stockholm, 1901–1903, **5** : 1–276.

Canu, F. 1898. Étude sur les Ovicells des Bryozoaires du Bathonien d'Occaignes. *Bull. Soc. géol. Fr.* Paris, 3, **26** : 259–285.

—— 1913. Contributions a l'étude des Bryozoaires fossiles. *Aull. Soc. géo . Fr.* Paris, 4, **13** : 267–276.

—— 1918. Les Ovicelles des Bryozoaires Cyclostomes. *Bull. Soc. géol. Fr.*, Paris, 4, **16** : 324–335.

Canu, F. & Bassler, R. S. 1920. North American Early Tertiary Bryozoa. *Bull. U.S. natn. Mus.* Washington, **106** : 1–879.

Gregory, J. W. 1896. Catalogue of the Jurassic Bryozoa. *Br. Mus. nat. Hist.* (Geol.), London: 1–239.

Haime, J. 1854. Description des Bryozoaires fossiles de la formation Jurassique. *Mém. Soc. géol. Fr.* Paris, 2, **5** : 156–218.

Illies, G. 1963. Uber *Stomatopora dichotoma* (Lamx.) und *St. dichotomoides* (d'Orb.) [Bryoz. Cycl.] aus dem Dogger des Oberrheingebietes. *Oberrhein. geol. Abh.* Karlsruhe, **12** : 45–80.

Lamouroux, J. 1821. *Exposition Methodique des genres de l'Ordre des Polypiers.* 4to. viii+115 pp. 84 pls. Paris.

Lang, W. D. 1904. The Jurassic forms of the " Genera " *Stomatopora* and *Proboscina*. *Geol. Mag. Lond.*, **5** : 315–322.

—— 1907. The Evolution of *Stomatopora dichotomoides*. *Geol. Mag. Lond.* **5** : 20–24.

Michelin, H. 1840–47. *Iconographie Zoophytologique, description par localités et terrains des Polypiers Fossiles de France et pays environnants.* 4to. xii+348 pp. 79 pls. Paris.

Orieux, M. 1939–40. Étude de quelque Bryozoaires jurassiques. *Ann. Paléont.* Paris, **28** 1 : 1–24, pls. 1–5.

Osburn, R. C. 1953. Bryozoa of the Pacific Coast of America. Part 3. *Rep. Allan Hancock Pacific Exped.*, Los Angeles, **14** : 613–784, pls. 65–82.

Reuss, A. 1867. Die Bryozoen, Anthozoen, und Spongiarien des braunen Jura von Balin bei Krakau. *Denk. k. Akad. Wiss. Wien.* **27** : 1–26.

Sauvage, H. E. 1899. Note sur les Bryozoaires jurassiques de Boulogne. *Bull. Soc. géol. Fr.* Paris, 3, **17** : 38–53.

Walford, E. 1889. On some Bryozoa from the Inferior Oolite of Shipton Gorge, Dorset. Part I. *Q. Jl geol. Soc. Lond.*, **45** : 561–574.

Lesley John Pitt
1 Lancaster Road
Harrow
Middx.